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Research Paper

Sleep Disturbances in Patients With Major Depressive Disorder: Incongruence Between Sleep Log and Actigraphy

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A B S T R A C T

Objective: Depression has become a severe global health problem, and sleeping difficulties are typically associated with depression. The purpose of this study was to investigate the relationships among subjective sleep quality, objective sleep quality, and the sleep hygiene practices of hospitalized patients with major depressive disorder.
Method: Daily sleep logs and actigraphy were used to obtain subjective and objective sleep data. Thirty patients were recruited from a regional teaching hospital in Taipei and completed the Hamilton Rating Scale for Depression and the Sleep Hygiene Practice Scale.
Results: Significant differences were found between subjective and objective sleep data in patients with major depressive disorder (MDD). For patients with more severe depression, subjective measurements obtained using sleep logs, such as total sleep time and sleep efficiency, were significantly lower than those obtained using actigraphy by controlling for demographics.
Conclusions: The results regarding the differences between subjective and objective sleep data can be a reference for care providers when comforting depression patients who complain of sleep disturbance.

Currently, major depression is a severe global health problem. The World Health Organization reported that the global prevalence of major depression is 5–10%, and the lifetime prevalence rate for women is 10–20%, which is higher than the lifetime prevalence rate for men (World Health Organization, 2009). In recent years, sleep problems have been considered seriously and most research has focused on adults without mental diseases; however, 90% of people who experience depression complain about sleep quality (Tsuno, Besset, & Ritchie, 2005). Forty percent of patients with major depressive disorder (MDD) complain of sleeping problems, such as difficulty falling, staying asleep, or waking up early in the morning (Perlis et al., 1997). Therefore, sleeping difficulties have been associated with and are a precursor and a negative prognostic factor of the depression (Ford & Cooper-Patrick, 2001).

Sleep disturbance, which is a common complaint among MDD patients, involves impairment of both subjective and objective sleep parameters. Questionnaires or sleep diaries can be used to assess the subjective sleep data of a patient, and actigraphy can be employed to objectively assess sleep data (Buysse, Ancoli-Israel, Edinger, Lichstein, & Morin, 2006). A previous study exploring the effects of cognitive behavioral therapy indicated that all measures from sleep diary and actigraphy, except for total sleep time (TST), were increased in patients with comorbid MDD and insomnia (Manber et al., 2008). Moreover, compared with the objective parameters of people without MDD, the objective parameters of patients with MDD have suggested that the sleep patterns of MDD patients exhibit increased sleep latency, decreased TST, more nocturnal awakenings, decreased sleep efficiency, earlier waking times, longer sleep latency, and greater wake-after-sleep-onset (Gupta, Dahiya, & Bhatia, 2009). Sleep structure varies in patients with MDD, and subjective complaints about sleep disorders are common (Saletu-Zyhlarz et al., 2002).

Depression produces negative biases that occur during information processing (Nolen-Hoeksema & Hilt, 2008). Thus, patients with MDD may be biased and report poor sleep quality even when objective data indicate that they experienced undisturbed sleep (Chen, Burley, & Gotlib, 2012). The relationship between sleep disturbances and depression has been researched widely (Gupta et al., 2009; Mayers, Grabau, Campbell, & Baldwin, 2009; McCall et al., 2010; McNamara, Auerbach, Johnson, Harris, & Doros, 2010). However, data from studies that simultaneously assessed sleep subjectively and objectively are rare (Matousek, Cervena, Zavesicka, & Brunovsky, 2004; McCall et al., 2012). Because the subjective and objective data of patients with depression differ, and patients tend to process information with negative biases, the present study investigated the relationship between subjective and objective sleep quality, sleep hygiene practices, and depression level in hospitalized patients with MDD. Because the causal direction of insomnia and depression is unclear, objective and subjective

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evaluations of sleep quality can serve as a reference for nurses caring for patients with MDD and comorbid sleep disturbances.

METHOD

A cross-sectional correlational design was employed to explore the relationship between and compare objective and subjective sleep data. The sample comprised 30 Taiwanese adults (18 women and 12 men; mean age, 42.97 years) who fulfilled *Diagnostic and Statistical Manual of Mental Disorders-IV-text revision* (*DSM-IV-TR*) criteria for major depression and were recruited from a medical center and a regional teaching hospital. All patients were physically healthy and none of their medical conditions caused their depression. People who fulfilled the criteria for a lifetime diagnosis of schizophrenia, schizoaffective disorder, organic affective syndrome, bipolar disorder, or borderline or antisocial personality disorder or had a history of alcohol or substance dependence were excluded.

MEASURES

Hamilton Rating Scale for Depression

Upon beginning this study, patients completed a 17-item version of the Hamilton Rating Scale for Depression (HRSD), which was administered by a trained independent clinician. The HRSD, developed by Hamilton and published in 1960 (Bagby, Ryder, Schuller, & Marshall, 2004; Hamilton, 1960), is a clinician-administered interview scale that evaluates the experiences of the present and past weeks by assessing varied responses to items that gauge the severity of 17 symptoms of depression. The total score ranges from 0 to 52; eight items are ranked from 0 to 2 and nine items are ranked from 0 to 4 (higher scores indicate greater depression severity). Studies investigating the HRSD have indicated that the questionnaire has a wide range of internal consistency (Cronbach's $\alpha = 0.46$–0.97) and interrater reliability ($\gamma = 0.82$–0.98) (Bagby et al., 2004). The HRSD has been verified as having acceptable internal consistency (Cronbach's $\alpha = 0.71$) and high interrater reliability (0.92) (Hsiao, 2009; Zheng et al., 1988).

Sleep Hygiene Practice Scale

The Sleep Hygiene Practice Scale (SHPS) is used to assess four domains: arousal-related behaviors, sleep scheduling and time, eating and drinking behaviors, and sleep environment. The SHPS is a 30-item self-rating scale. Respondents rate how frequently they engage in behavioral practices on a 6-point Likert scale, ranging from 1 (*never*) to 6 (*always*) (Yang, Lin, Hsu, & Cheng, 2010). Higher scores indicate a higher frequency of inappropriate sleep hygiene behavior (Lin, Yang, Hsu, & Cheng, 2009). A previous study comparing patients with insomnia with those without insomnia indicated that the Cronbach's α value was 0.58 and 0.70, respectively, for arousal-related behavior; 0.65 and 0.67, respectively, for sleep environment; 0.70 and 0.72, respectively, for eating and drinking behavior; and 0.74 and 0.82, respectively, for sleep scheduling and timing (Yang et al., 2010).

Subjective Sleep Quality: Sleep Log

Each morning for 14 consecutive days, participants in this study completed a sleep log that was used to assess subjective sleep according to information such as bedtime, estimated time required to fall asleep (sleep latency, SL), waking episodes, TST, rising time, and number and duration of daytime naps. Total time spent in bed was calculated by subtracting the bedtime from the rising time. Sleep efficiency was calculated as the ratio of TST to total time spent in bed. In addition, the participants recorded their sleep quality (ranging from 0 to 5; lower scores indicated more tiredness and poorer sleep quality).

Objective Sleep Quality: Actigraphy

Each participant wore a wrist actigraph (Mini Motionlogger Actigraphy, Ambulatory Monitoring, Ardsley, NY, USA) on the nondominant wrist 24 hours per day for 2 weeks during the prospective screening step. The actigraphic data were analyzed to monitor the activity level of shift nurses at 1-minute intervals throughout the study. We used the "zero crossing mode" of an automatic sleep-scoring program to calculate the number of times in 1 minute that the activity signal level crossed zero. The total time spent in bed, TST, sleep-onset latency, waking after sleep onset, waking episodes, and sleep efficiency were calculated using Action W2 software.

Data Collection

The HRSD as well as 2 weeks of sleep logging and actigraphy was used to assess the severity of the present depressive episode and sleep data. Patients who participated in the study provided informed consent. During the first night, the patients adapted to the environment; sleep data from the second night were used for analysis. Lights were typically turned off at 10:00 p.m. and turned on at 6:00 a.m., according to the habitual sleep or wake schedule in the psychiatric ward. The data collected were anonymous and carefully examined to determine whether the completed responses were usable for scoring and verification.

Ethical Approval

This study was approved by the Taipei City Hospital Institutional Review Boards and Tri-Service General Hospital (approval numbers TCHIRB-990802-E and SS099-02). All participants received an informed consent form that explained the study and informed them of their responsibilities and rights to withdraw at any time during the study. Participants were voluntary and anonymous in this study.

Statistical Analysis

SPSS for Windows Version 17.0 software was used to perform data analysis in this study. Before analysis, all data were examined to ensure accuracy and identify missing values. Descriptive analysis was employed to examine the demographic data. The data and distribution of each parameter are expressed using frequencies, percentages, averages, and standard deviations (SDs). The paired *t* test, Pearson's correlation test, and multiple linear regression were performed to ascertain the relationship between subjective and objective sleep data.

Table 1
Demographic Characteristics of the Sample ($N = 30$)HRSD: Hamilton Rating Scale for Depression.

Variable	*n* (%)
Gender	
Male	12 (40.0)
Female	18 (60.0)
Smoking status	
No	21 (70.0)
Yes	9 (30.0)
Drinking alcohol status	
No	27 (90.0)
Yes	3 (10.0)
Chronic disease	
No	21 (70.0)
Yes	9 (30.0)
Variable	**Mean ± SD**
Age, years	42.97 ± 11.21
Psychiatric hospitalization (number of times)	5.93 ± 5.19
Sleep hygiene practice	95.20 ± 19.22
HRSD	21.63 ± 3.62

Table 2
Comparisons of Sleep Parameters by Using the 2-Week Daily Sleep Log and Wrist Actigraphy ($N = 30$).

Variable	2-week daily sleep log (Mean ± SD)	Wrist actigraphy (Mean ± SD)	Paired *t* test	*p*	*r*	*p*
Sleep-onset latency, minutes	45.17 ± 32.44	12.12 ± 9.57	5.09	0.00**	−0.19	0.31
Waking episodes, number of times	2.1 ± 2.04	13.36 ± 6.17	−9.08	0.00**	−0.16	0.41
Waking after sleep onset, minutes	NA	61.09 ± 30.03	–	–	–	–
Total time spent in bed, minutes	507.86 ± 117.02	550.71 ± 70.89	−2.23	0.03*	0.46	0.01*
Total sleep time, minutes	336.00 ± 130.98	489.62 ± 89.45	−5.46	0.00**	0.06	0.75
Sleep efficiency, %	66.81 ± 20.74	90.09 ± 6.60	−5.89	0.00**	0.02	0.93
Sleep quality (0–5 points)	2.97 ± 1.13	NA	–	–	–	–

NOTE. NA: not applicable; SD: standard deviation.
* $P < 0.05$.
** $P < 0.001$.

RESULTS

Table 1 summarizes the demographic and clinical characteristics of 30 patients with depression (12 men and 18 women). The mean age of the depression patients was 42.97 years (SD: 11.21 years). Most (70%) of the patients did not have chronic diseases, and the mean value of psychiatric hospitalization was 5.93 times (SD: 5.19). The mean SHPS and HRSD scores were 95.20 (SD: 19.22) and 21.63 (SD: 3.62), respectively.

Table 2 shows a comparison of the data obtained using the 2-week daily sleep log and wrist actigraphy. The paired *t* test was applied to determine whether results from the 2-week daily sleep log and wrist actigraphy differed. Significant differences were observed in sleep-onset latency ($t = 5.09$, $p < .001$), waking episodes ($t = -9.08$, $p < .001$), total time spent in bed ($t = -2.23$, $p < .05$), total sleep time ($t = -5.46$, $p < .001$), and sleep efficiency ($t = -5.89$, $p < .001$). In addition, the total time spent in bed were significantly correlated with actigraphy data ($r = 0.46$, $p < .05$).

The numbers and percentages of sleep parameters consistent with the definition of sleep disturbances are shown in Table 3. Actigraphy recorded higher sleep disturbance number and waking episodes than daily sleep logs did. Table 4 shows the relationship between depression level and differences in sleep data between subjective data (sleep logs) and objective data (actigraphy) by controlling for demographic characteristics. The significantly negative or positive β *value* indicated that the significant difference was found between subjective and objective data. For the impact of depression status, patients with high level of depression had more difference between subjective and objective TST ($\beta = -0.58$, $p < .05$) and sleep efficiency ($\beta = -0.56$, $p < .05$) by controlling for the gender, smoking status, drinking status, chronic disease, age, psychiatric hospitalization, and SHPS.

DISCUSSION

Although patients with MDD frequently complain about not sleeping adequately, clinical care providers observe that patients fall asleep. This study evaluated the concordance between subjective and objective data collected from patients who were diagnosed with MDD. The results indicated that substantial differences existed between the subjective and objective data among patients with MDD.

Significant differences were observed in sleep-onset latency, waking episodes, total time spent in bed, total sleep time, and sleep efficiency between subjective and objective data (Table 2). Five of the six sleep parameters differed between subjective and objective data. The result regarding waking episodes shown in Table 2 was consistent with the results of a study on patients with lung cancer that indicated the number of waking episodes recorded by actigraphy was higher than the number recorded in daily sleep logs (Wang, Chang, & Lin, 2010). Sleep disturbance was defined as more than two waking episodes per night (Morin et al., 1999), more than 30 minutes of sleep-onset latency (Berger & Higginbotham, 2000; Espie, Inglis, & Harvey, 2001), TST of 6.5 hours or less (Lacks & Morin, 1992), or 85% or lower sleep efficiency (Berger & Higginbotham, 2000). The results in Table 3 show that the objective waking episodes exceeded the subjective waking episodes; this result is consistent with the results shown in Table 2. In other words, the objective data indicated that patients woke more than they realized and spent more time in bed as they thought. This disparity possibly caused the differences between subjective and objective measurements.

Table 3
Sleep Disturbance Determined Using the 2-Week Daily Sleep Log and Wrist Actigraphy ($N = 30$).

	2-Week Daily Sleep Log, *n* (%)	Wrist Actigraphy, *n* (%)
Sleep disturbance	25 (83.3)	30 (100.0)
Sleep parameters		
Waking episodes >2 times/night	7 (23.3)	30 (100.0)
Sleep-onset latency >30 minutes	15 (40.0)	2 (6.7)
Total sleep time ≤6.5 hours	22 (73.3)	4 (13.3)
Sleep efficiency ≤85%	24 (80.0)	5 (16.7)

NOTE. Sleep disturbance was defined as waking episodes >2 times per night, sleep-onset latency >30 minutes, total sleep time ≤6.5 hours, or sleep efficiency ≤85%.

Table 4
Comparison of Demographic Characteristics to Differences of 2-Week Daily Sleep Log and Wrist Actigraphy on Sleep Parameters ($N = 30$).

Variable	ΔSleep-onset latency ß value	ΔWaking episodes ß value	ΔTotal time spent on bed ß value	ΔTotal sleep time ß value	ΔSleep efficiency ß value
Gender					
Female	Ref	Ref	Ref	Ref	Ref
Male	0.12	0.00	−0.38	−0.13	0.03
Smoking status					
No	Ref	Ref	Ref	Ref	Ref
Yes	−0.13	−.29	0.17	0.10	0.03
Drinking status					
No	Ref	Ref	Ref	Ref	Ref
Yes	0.14	−0.03	−0.22	−0.34	−0.36
Chronic disease					
No	Ref	Ref	Ref	Ref	Ref
Yes	0.04	0.05	−0.05	0.19	0.20
Age	−0.48	−0.05	0.23	0.51*	0.48
Psychiatric hospitalization	0.08	0.35	−0.25	−0.43*	−0.29
SHPS	−0.49	0.30	−0.13	0.34	0.57*
HRSD	0.25	−0.06	−0.22	−0.58*	−0.56*

NOTE. Ref: reference group, SHPS: Sleep Hygiene Practice Scale, HRSD: Hamilton Rating Scale for Depression. Δ indicated that the difference was calculated by subtracting objective data (actigraphy) from subjective data (sleep logs).
* $P < 0.05$.

Therefore, care providers should listen to patient complaints and attempt to comfort them and help them feel at ease.

Table 2 indicates that the subjective sleep-onset latency was longer than the measurements recorded objectively. Sleep-onset latency that exceeded 30 minutes recorded in the daily sleep log was greater than the sleep-onset latency measured using actigraphy (Table 3). This result was consistent with the results determined in a previous study, which indicated that patients with bipolar disorders tended to overestimate their sleep-onset latency (Harvey, Schmidt, Scarnà, Semler, & Goodwin, 2005). Because depression can cause negative biases when processing information (Nolen-Hoeksema & Hilt, 2008), the time perception of patients with depression might not be as accurate as that of people without depression. Although depression patients might feel that they spent a long time falling asleep, the length of time they actually required to fall asleep was not that long.

Table 3 shows that sleep efficiency ≤85% was more frequently recorded using subjective measures than objective measures. In Table 4, patients with more severe depression revealed that larger differences were found between subjective and objective sleep data. Because depression causes sleep disorders, the medicine depressed patients used may have caused them to experience less REM and believe that their total sleep time was shorter and that their sleep efficiency was poor. A previous study on sleep patterns indicated that most depressed patients complained of lower sleep efficiency and indicated that sleep efficiency differed between people with depression and those without depression (Gupta et al., 2009). Thus, the subjective and objective data of depression patients possibly differ significantly. Table 3 shows that the number of patients with a TST of 6.5 hours or less was 4 in objective data, possibly because the lights at the hospital in which the patients were staying were turned off at 10:00 p.m. and turned on at 6:00 a.m. This schedule may have caused patients to follow the habitual sleep or wake schedule in the ward.

This study had limitations. First, the purpose of the study was to investigate the relationship between sleep and depression; therefore, the effects antidepressants exert on sleep were not addressed. Second, the findings are limited because only inpatients were observed; thus, the results regarding sleep disturbance are not applicable to outpatients. Third, the subjective sleep and objective sleep variables were only partially correlated, possibly because a sleep log was used. Patients' recordings of subjective sleep data may have been influenced by their depression, and therefore, the reported sleep quality may have been biased. Fourth, the study participants were patients with depression; a study demonstrated that people at a high risk of depression have negative biases when processing information (Nolen-Hoeksema & Hilt, 2008). Therefore, the subjective information obtained may not have been as accurate as the objective data. Lastly, the study participants were Taiwanese and all questionnaires were Chinese versions. If a similar study were conducted in other countries, results may vary because of cultural differences. Future research should investigate the effects antidepressants exert on sleep, include outpatients, or not limit the sleep data. These suggestions may facilitate future research pertaining to sleep disturbances and other sleep-quality-related information.

CONCLUSION

This study indicated that significant differences existed among subjective and objective sleep data on patients with MDD. The subjective TST and sleep efficiency reported by patients with more severe depression were significantly lower than those indicated by objective measurements. This study verified that depression affects patient sleep efficiency and causes biases in processing sleep information. Care providers should assist and comfort patients with depression by understanding the differences between subjective and objective data.

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References

Bagby, R. M., Ryder, A. G., Schuller, D. R., & Marshall, M. B. (2004). The Hamilton Depression Rating Scale: has the gold standard become a lead weight? *American Journal of Psychiatry*, *161*(12), 2163–2177.

Berger, A. M., & Higginbotham, P. (2000). Correlates of fatigue during and following adjuvant breast cancer chemotherapy: A pilot study. *Oncology Nursing Forum*, *27*(9), 1443–1448.

Buysse, D. J., Ancoli-Israel, S., Edinger, J. D., Lichstein, K. L., & Morin, C. M. (2006). Recommendations for a standard research assessment of insomnia. *Sleep*, *29*(9), 1155–1173.

Chen, Michael C., Burley, Hannah W., & Gotlib, Ian H. (2012). Reduced sleep quality in healthy girls at risk for depression. *Journal of Sleep Research*, *21*(1), 68–72, http://dx.doi.org/10.1111/j.1365-2869.2011.00934.x.

Espie, C. A., Inglis, S. J., & Harvey, L. (2001). Predicting clinically significant response to cognitive behavior therapy for chronic insomnia in general medical practice: Analysis of outcome data at 12 months posttreatment. *Journal of Consulting and Clinical Psychology*, *69*(1), 58–66.

Ford, D. E., & Cooper-Patrick, L. (2001). Sleep disturbances and mood disorders: An epidemiologic perspective. *Depression and Anxiety*, *14*(1), 3–6, http://dx.doi.org/10.1002/da.1041.

Gupta, R., Dahiya, S., & Bhatia, M. S. (2009). Effect of depression on sleep: Qualitative or quantitative? *Indian Journal of Psychiatry*, *51*(2), 117–121.

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, *23*, 56–62.

Harvey, A. G., Schmidt, D. A., Scarnà, A., Semler, C. N., & Goodwin, G. M. (2005). Sleep-related functioning in euthymic patients with bipolar disorder, patients with insomnia, and subjects without sleep problems. *American Journal of Psychiatry*, *162*(1), 50–57.

Hsiao, Y. L. (2009). *Neuropsychological functions in patients with bipolar I and bipolar II disorder*. Tainan City, Taiwan: National Cheng Kung University.

Lacks, P,, & Morin, C. M. (1992). Recent advances in the assessment and treatment of insomnia. *Journal of Consulting and Clinical Psychology*, *60*, 586Y594.

Lin, S. C., Yang, C. M., Hsu, S. C., & Cheng, C. P. (2009). Reliability and validity of the Sleep Hygiene Practice Scale. *Archives of Clinical Psychology*, *4*(2), 105–115.

Manber, R., Edinger, J. D., Gress, J. L., San Pedro-Salcedo, M. G., Kuo, T. F., & Kalista, T. (2008). Cognitive behavioral therapy for insomnia enhances depression outcome in patients with comorbid major depressive disorder and insomnia. *Sleep*, *31*(4), 489–495.

Matousek, M., Cervena, K., Zavesicka, L., & Brunovsky, M. (2004). Subjective and objective evaluation of alertness and sleep quality in depressed patients. *BMC Psychiatry*, *4*(1), 1–7, http://dx.doi.org/10.1186/1471-244X-4-14.

Mayers, Andrew G., Grabau, Emma A. S., Campbell, Christine, & Baldwin, David S. (2009). Subjective sleep, depression and anxiety: Inter-relationships in a non-clinical sample. *Human Psychopharmacology: Clinical and Experimental*, *24*(6), 495–501, http://dx.doi.org/10.1002/hup.1041.

McCall, W. Vaughn, Blocker, Jill N., D'Agostino, Ralph, Jr., Kimball, James, Boggs, Niki, & Lasater, Barbara (2010). Insomnia severity is an indicator of suicidal ideation during a depression clinical trial. *Sleep Medicine*, *11*(9), 822–827, http://dx.doi.org/10.1016/j.sleep.2010.04.004.

McCall, W. V., Blocker, J. N., D'Agostino, R., Jr., Kimball, J., Boggs, N., Lasater, B., & Rosenquist, P. B. (2012). Comparison of actigraphy with polysomnography and sleep logs in depressed insomniacs. *Journal of Sleep Research*, *21*(1), 122–127, http://dx.doi.org/10.1111/j.1365-2869.2011.00917.x.

McNamara, Patrick, Auerbach, Sanford, Johnson, Patricia, Harris, Erica, & Doros, Gheorghe (2010). Impact of REM sleep on distortions of self-concept, mood and memory in depressed/anxious participants. *Journal of Affective Disorders*, *122*(3), 198–207, http://dx.doi.org/10.1016/j.jad.2009.06.030.

Morin, C. M., Hauri, P. J., Espie, C. A., Spielman, A. J., Buysse, D. J., & Bootzin, R. R. (1999). Nonpharmacologic treatment of chronic insomnia: An American Academy of Sleep Medicine review. *Sleep*, *22*, 1134Y56.

Nolen-Hoeksema, S., & Hilt, L. M. (2008). *Handbook of depression in adolescents*. Taylor & Francis.

Perlis, M. L., Giles, D. E., Buysse, D. J., Thase, M. E., Tu, X., & Kupfer, D. J. (1997). Which depressive symptoms are related to which sleep electroencephalographic variables? *Biological Psychiatry*, *42*(10), 904–913.

Saletu-Zyhlarz, G. M., Abu-Bakr, M. H., Anderer, P., Gruber, G., Mandl, M., Strobl, R., Gollner, D., Prause, W., & Saletu, B. (2002). Insomnia in depression: Differences in objective and subjective sleep and awakening quality to normal controls and acute effects of trazodone. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *26*(2), 249–260, http://dx.doi.org/10.1016/S0278-5846(01)00262-7.

Tsuno, N., Besset, A., & Ritchie, K. (2010). Sleep and depression. *Journal of Clinical Psychiatry*, *66*(10), 1254–1269, http://dx.doi.org/10.1097/NCC.1090b1013e3181b3278e.

Wang, S. Y., Chang, H. J., & Lin, C. C. (2010). Sleep disturbances among patients with non-small cell lung cancer in Taiwan: Congruence between sleep log and actigraphy. *Cancer Nursing*, *33*(1), E11–E17, http://dx.doi.org/10.1097/NCC.1090b1013e3181b3278e.

World Health Organization (2009). Depression. Retrieved December 31, 2009, from. http://www.searo.who.int/en/section1174/section1199/section1567_6741.htm

Yang, C. M., Lin, S. C., Hsu, S. C., & Cheng, C. P. (2010). Maladaptive sleep hygiene practices in good sleepers and patients with insomnia. *Journal of Health Psychology*, *15*(1), 147–155, http://dx.doi.org/10.1177/1359105309346342.

Zheng, Y. P., Zhao, J. P., Phillips, M., Liu, J. B., Cai, M. F., Sun, S. Q., et al. (1988). Validity and reliability of the Chinese Hamilton Depression Rating Scale. *British Journal of Psychiatry*, *152*(5), 660–664, http://dx.doi.org/10.1192/bjp.152.5.660.